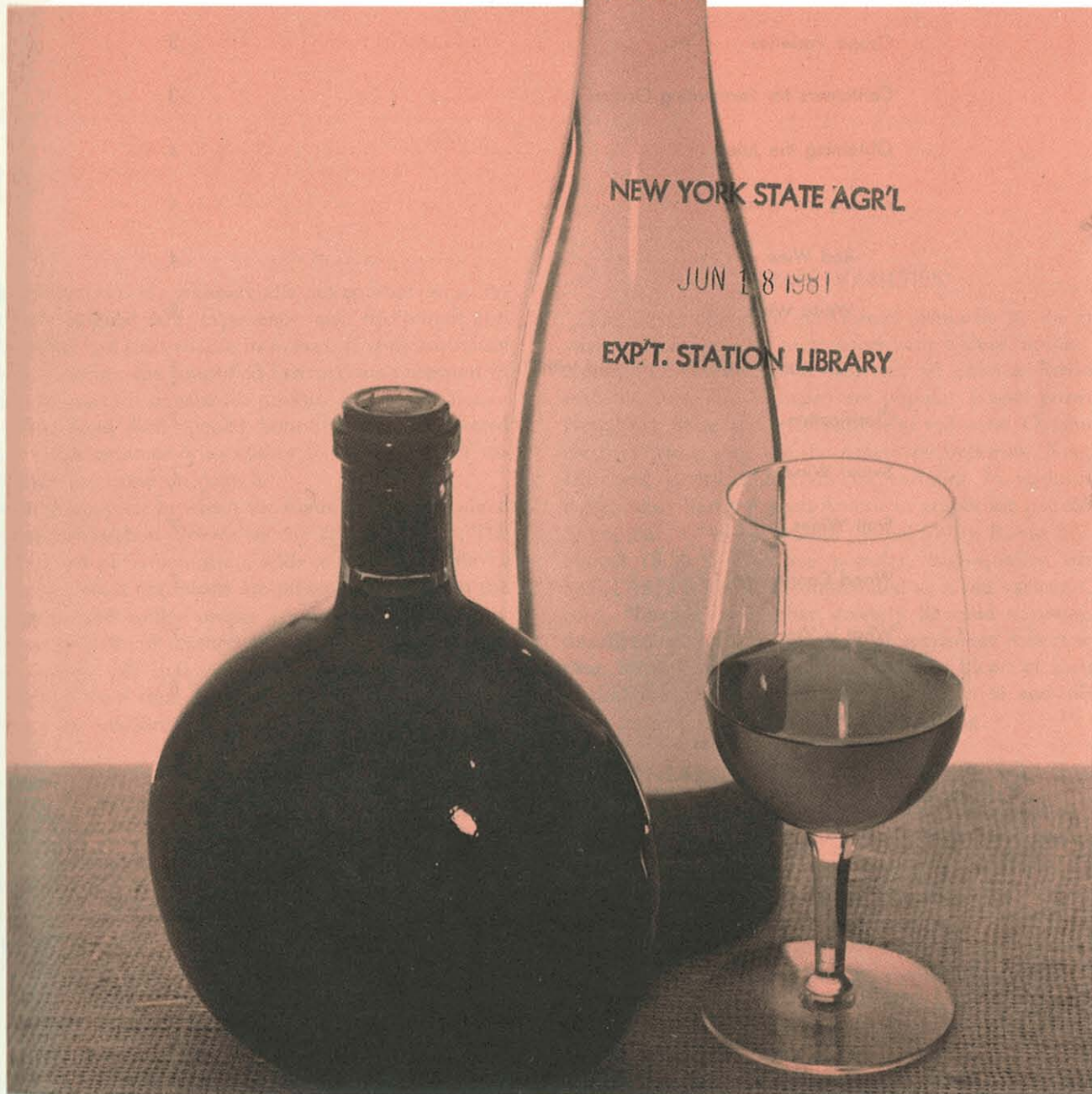


Homemade Wine

by Willard B. Robinson

AN EXTENSION PUBLICATION OF THE NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES,
A STATUTORY COLLEGE OF THE STATE UNIVERSITY, AT CORNELL UNIVERSITY, ITHACA, NEW YORK



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The production of commercially acceptable wine requires technological skill, experience, and equipment and materials that are unavailable in homes. If conscientiously followed, however, the simplified instructions presented in this bulletin make it possible to produce acceptable home-made wine from well-ripened, sound grapes. Suggested books for the amateur who wishes to be assured of excellent wine are listed on page 8.

Wine is grape juice in which the sugar has been changed to alcohol and carbon dioxide by the action of yeast. The process, known as fermentation, adds to the natural flavor of the grape. Yeast organisms are present naturally on the ripe clusters, and under proper conditions will multiply rapidly in the juice of crushed grapes. The yeast produces carbon dioxide gas that escapes, leaving ethyl alcohol. The product may then be refined by such wine cellar operations as clarification, blending, fortification, and sweetening.

Although there are many kinds of wine, the beginner must be more concerned with the technique than with the particular kind of wine. The directions that follow are for two basic types of wine that have been produced for centuries, and make up the bulk of wine consumed today. The wines produced according to these instructions will be dry (not sweet), with alcohol contents of about 12 to 13 percent. Well-known red table wines are Burgundy, Claret, and Chianti. White wines of this type are Rhine, Châblis, Riesling, and Moselle.

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GRAPE VARIETIES

The flavor of wine is determined primarily by the grape variety. Because wine preferences vary widely, no one can recommend varieties that will suit all palates. Fredonia, Isabella, Ives, and Concord are popular grapes grown in New York State and widely used for red wine. Commonly used for white wine are the American Delaware, Niagara, Dutchess, Elvira, and Catawba varieties. In addition to these, many hardy French-American grapes are increasingly popular. Of these, Aurore (Seibel 5279), Ravat 51, and Seyval (S.V. 5-276) are popular, high-quality whites. Seibel 9549 is highly recommended as a red variety. Concord, Niagara, and other strongly flavored varieties are usually more suitable for sweet or semisweet dessert wines than for dry table wines. Frequently, a blend of varieties is desirable. Experimentation with varieties and blends adds interest to the hobby of wine making.

CONTAINERS FOR FERMENTING GRAPES

Gallon jugs and two- to five-gallon carboys make excellent containers for small lots of wine. Glass containers are easy to clean and seal, and their transparency allows you to follow the progress of the wine and to exercise greater care in siphoning operations.

Wood containers can be used, but are more difficult to sterilize; unless they are prepared with great care, wood containers can contribute undesirable flavors to the wine. Further recommendations for using wooden containers are on page 7.

Except for stainless steel, wine should not be in contact with metals. Enamelware containers should be free of chips and cracks. All wine-making equipment should be thoroughly cleaned and rinsed before use.

OBTAINING THE JUICE

Grapes should be carefully washed before pressing, especially if sulfur has been used as a vineyard fungicide. Grape juice can be separated from the pulp and seeds by crushing and pressing the grapes before fermentation, or by crushing the grapes and leaving them to ferment for a few days in a suitable container. In the latter procedure, the pulp and skins will rise to the surface where they can be skimmed off.

Juice for white wine should be obtained by the first method; the second method is used to extract color from the grapes for red wine. Although it is not essential for all wines, the addition of sulfite to the crushed grapes is good insurance against oxidation and the action of undesirable organisms during fermentation.

MAKING THE WINE

Two bushels of grapes will yield 5 to 7 gallons of finished wine. The amount of wine depends on the pressing yield, the use of amelioration, and the extent of taste testing during the various stages of wine cellar operations.

Red Wine

Step 1. Stem the well-rinsed ripe grapes, eliminating decomposed fruit, leaves, and other debris.

Step 2. Place the berries in a large, clean container such as a 20-gallon crock.

Step 3. Crush the grapes. A 4-foot length of post with a 6-inch square board nailed to the end and painted with hot paraffin serves as a pestle.

Step 4. (Optional) Add either potassium bisulfite or potassium metabisulfite at the rate of 0.2 gram per kilogram or 0.1 gram per pound of grapes.¹ These chemicals are available from chemical dealers or wine-making suppliers. Dissolve the required amount in a little water or juice, and use only fresh solution.

Step 5. (Optional) After 24 hours, add a yeast starter. This is prepared by adding a yeast culture to a quart of pasteurized juice 3 days before the starter is required. The juice is pasteurized by heating to a simmering boil, then cooling. Be sure the pasteurized juice is cool before adding the yeast culture. Stopper the bottle loosely with absorbent cotton to avoid contamination and at the same time to allow the carbon dioxide gas to escape.

Step 6. If a Brix hydrometer or hand refractometer is available, determine the sugar content of the juice, and calculate the amount of cane sugar required to adjust the juice to 21 percent sugar content. For average quality Concord grapes with a 16 percent sugar content, add ½ pound of sugar for each gallon of juice, or about 3½

pounds of sugar for a 2-bushel lot. If too much sugar is added, some will remain at the end of fermentation and the wine will be sweet. If sugar is insufficient, the alcohol content of the wine will be low. The sugar should not be added until after the grapes are pressed (step 8) when the juice yield can be measured and the quantity required can be estimated more accurately.²

Step 7. Allow the grapes to ferment for 4 or 5 days. During this time, stir the contents and push down the cap of rising grapes twice a day. At the end of 5 days, the grapes should have formed a distinct cap; and the juice can be withdrawn. The remaining pulp and skins can be squeezed by hand through a cheesecloth bag, or a small fruit press can be used.

Step 8. Add sugar to the separated, fermenting juice according to the calculations made in step 6. In addition to adjusting the juice to 21 percent sugar content, it can be ameliorated at this time as follows: add up to 30 percent of a sugar syrup to dilute the flavor or acidity and increase the yield. Make the syrup by dissolving 2 pounds of sugar in enough water to make 1 gallon of syrup. Although amelioration is a matter of personal preference, it is probably best for strong-flavored grapes such as Concord, but less desirable for delicately flavored varieties like Delaware. If the acidity of the grapes is unusually high, amelioration can be a real advantage.

Step 9. Pour the sweetened, fermenting juice into glass carboys, gallon jugs, or wooden kegs. Never pour juice into metal containers unless you are fortunate enough to own stainless steelware. After filling the major containers, save the remaining small quantities in containers of appropriate size (a gallon in a gallon jug; a quart in a quart bottle). Use these small quantities later to keep the large containers full.

Step 10. On the day that the frothing of active fermentation subsides, the containers must be filled completely and fitted with water traps to exclude air from the wine and to allow the carbon dioxide gas to escape. The trap consists of a short tube leading from the stoppered container to a small bottle of water. Convenient plastic or glass traps are sold at winemakers' supply houses. The tube should not touch the surface of the wine, and the opposite end of the tube must be immersed in water at all times. Glass tubing can be obtained from plumbing shops or hardware stores. Plastic tubing can be used and bent by hand. Each container holding fermenting wine should have a water trap.

Step 11. The containers of wine should be stored at 55°F. to 65°F. The wine will bubble vigorously for several days, then at a reduced rate for several weeks. During fermentation, yeast cells and pulp will collect in a layer at the bottom of the container. Six weeks to 2 months after crushing, the wine should be siphoned (racked) into

¹This is roughly equivalent to the usually recommended 100 parts per million of sulfur dioxide. This level is obtained by adding potassium metabisulfite to juice at the rate of 0.175 gram per liter, or 0.65 gram per gallon.

²To raise the percentage of sugar in the juice 1 degree Brix requires grams of sugar per kilogram of juice or 1.6 ounces per gallon.

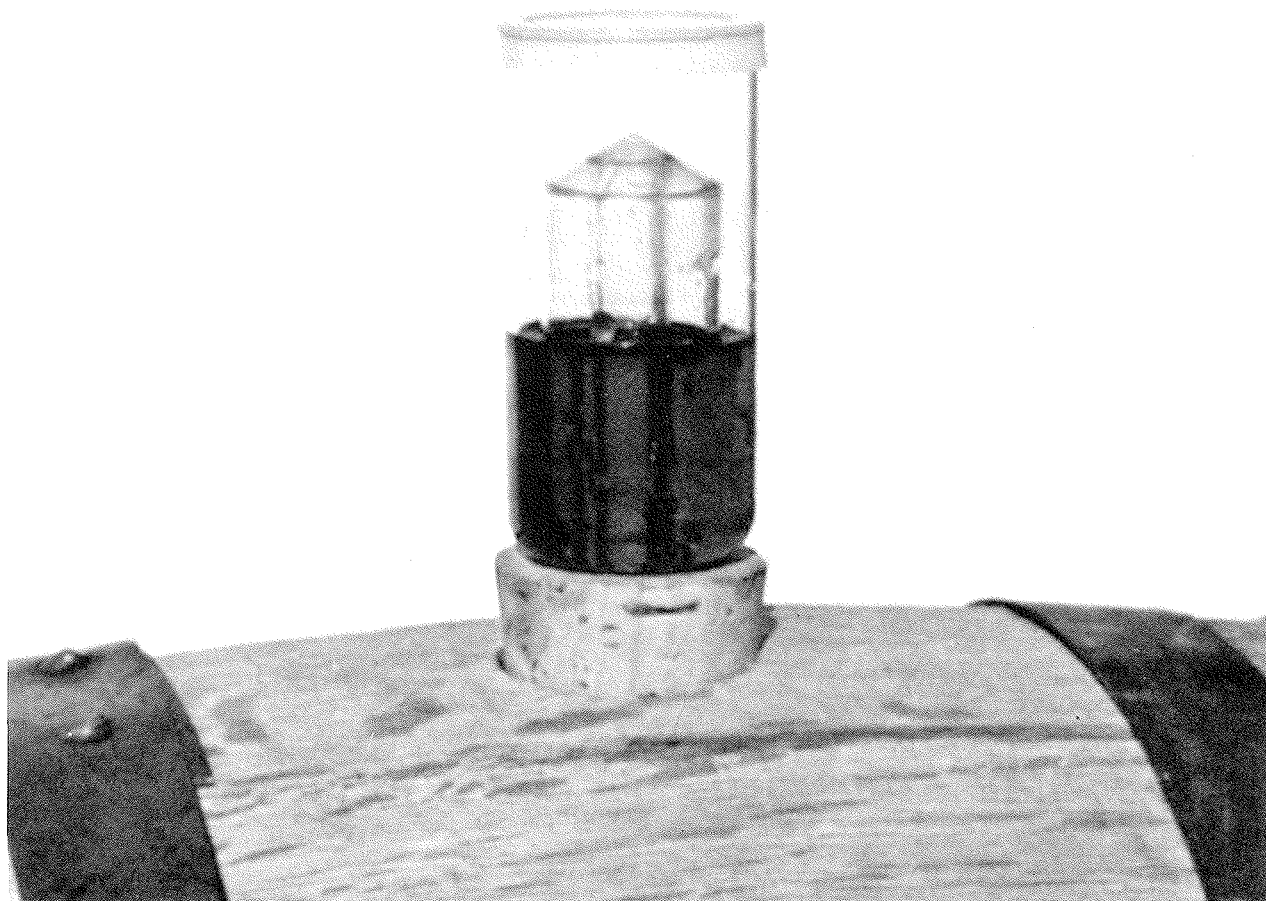


Figure 1. Barrel fitted with water trap

clean containers of similar size without disturbing the sediment. The advantage of glass containers is obvious at this step: the wine maker can see what he is doing. The containers should be filled to the top, and the water traps attached again. If there is an air space at the top, it is better to add a little water and dilute the wine than to let the wine stand in contact with oxygen. The yeasty flavor of the wine is still disagreeable at this stage.

Step 12. Racking should be repeated in February, by which time fermentation will be complete,³ and the containers, completely filled, can be tightly stoppered without the traps. The wine is still harsh at this stage, but has improved considerably. Holding the wine at a temperature just above freezing will help the clarification by increasing the crystallization of tartrates (winestones). Wine thus treated will not develop so much sediment in bottle storage.

³A simple test for completeness of fermentation can be made by testing for sugar. Clinistest tablets, available in most drug stores for testing urinary sugar, serve admirably. The tablets are now available in special kits for winemakers, under the trade name Dextrocheck. When the test result is below 0.5%, the wine can be considered dry. Warning: test papers available for glucose measurement are not suitable since sugars other than glucose are present in wine.

Step 13. When the wine is crystal clear, it can be bottled and sealed with screw caps, crown caps, or regular wine corks. Whatever closure is used, an airtight seal is of utmost importance. If the wine is to be stored for a considerable length of time, metal caps should be avoided since they are subject to corrosion. Screw caps sometimes allow air leakage, but our experience has been good when plastic caps fitted with polyethylene, convex liners were used.

White Wine

Steps 1 to 4. Follow the procedure for red wines, steps 1 to 4.

Step 5. For the finest white wine, the grapes should be pressed immediately after crushing; this is particularly true if white wine is to be made from red-skinned varieties, such as Catawba and Delaware. After sulfiting, allow juice to stand overnight; then decant or siphon the juice from the settlings. This helps to prevent development of disagreeable off-flavors and bitterness.

Step 6. Add sugar to juice, calculating the sugar requirement as in step 6 for red wines. For average quality Delaware grapes, approximately half as much sugar is needed as for Concord. When acidity is high, as frequent-



Figure 2. Water traps for fermentation locks can be part of a Kipp hydrogen generator (*left foreground*), hand blown (*right foreground*), or plastic traps purchased from homemade wine suppliers (*in rear*).

ly is the case with Catawbas, amelioration with sugar syrup (step 8 of the red wine procedure) may be advisable. Whether or not it is ameliorated, the juice should be adjusted to a 21 percent sugar content.

Step 7. (Optional) Add yeast starter, prepared as in step 5 of red wine procedure, and pour into suitable containers fitted with water traps. Then follow steps 9 through 13 of red wine procedure. If fermentation does not start within 48 hours after the addition of the starter, aerate the juice by pouring or siphoning between containers.

Alternative Procedure for Red Wine

A red wine can be prepared from red grapes if the crushed grapes are heated to 150°F. before pressing, thus allowing heat, rather than fermentation, to extract the pigment from the skins. The colored juice is then fermented according to the procedure for white wine.

CLARIFICATION

Most grape wines will become crystal clear of their own accord after the sugar has been completely fermented. This clarification is hastened (and often the yield of juice is improved) if a pectic enzyme is added to the crushed grapes before pressing. With most fruit wines, other than grapes, the use of pectic enzymes is usually advisable.

Occasionally a wine is encountered that requires special clarification treatment. A slurry of bentonite, added at the rate of a gram or two to a gallon, or the proprietary agent, Sparkolloid, will usually remove the haze particles. Heating the wine to 150°F. for 10 minutes will often coagulate dissolved protein, with resultant clarification. Combinations of gelatin and tannin, casein, skim milk, egg protein, and other fining agents have been recommended, but the above introduction must suffice for this brief bulletin.

SWEET WINES

The directions given will result in a dry table wine, containing no more than traces of sugar. For those who prefer a sweet wine, the simplest procedure is to sweeten to taste as the wine is consumed since sweet wines are sometimes subject to secondary fermentations.

Another procedure is to sweeten the wine to taste, then pasteurize by heating to 130°F. and holding for 20 minutes. Allow the bottles to lie on their sides to pasteurize the stopper before cooling.

A more professional procedure is to adjust the sugar content to 24° before fermentation; then when fermentation begins to subside, add potassium metabisulfite in sufficient quantity to halt the fermentation (1 gram per gallon). The addition of sulfite at this level will eliminate need for pasteurization, but some individuals find the sulfite taste objectionable.

FRUIT WINES

Various fruit (and vegetable) wines are made, using only slight modifications of the grape wine procedures.

Since most fruits have lower sugar contents than do grapes, the use of additional sugar is important. As with grape musts, the adjustment of the sugar content to 21° is important to produce approximately 12 percent alcohol, and the wines can be sweetened to taste when fermentation is completed. Addition of a yeast food is more important in these specialty wines since they are often low in essential nutrients for yeast growth.

WOOD CONTAINERS

Wooden containers are difficult to sterilize but are desirable for quantities of wine over 25 gallons. For such quantities, it is often more convenient to have the grapes pressed at a custom pressing plant (cider mill). After adjusting the sugar content of the juice, fermentation is then started in a barrel. Do not fill the barrel more than two-thirds full, or it will bubble over. After 5 to 7 days it can be filled and fitted with a water trap. Rack the wine after 6 or 8 weeks by withdrawing it through the spout or siphoning with a tube. Do not allow the barrel to stand partially full. If samples are withdrawn for testing, replace them with wine from small containers so that the barrel will remain full. If such replacement is not practiced, the wine will be badly oxidized and will start turning to vinegar by spring. Wooden containers should be filled with water for several days before use, then drained, refilled with a solution of hypochlorite bleach (15 fluid ounces per 10 gallons of water), and left for 24 hours. On the following day, the bleach is drained and the container rinsed until the odor of chlorine can no longer be detected. Barrels, particularly new oaken barrels, will contribute flavor to the contents. Frequent checking is essential. Remove the wine and bottle it when the wine has attained a desirable level of oak flavor; but always keep container filled until bottling.

WHAT IS VINEGAR?

Grape vinegar is fermented juice (wine) which has been left open to the air, allowing acetic-acid-producing organisms to develop. These change the alcohol to acetic acid. Failure to exclude air from the wine is the principal cause of failure among amateur winemakers. A good wine with a high acid content may "taste like vinegar" to someone accustomed to sweetened wines such as port, tokay and muscatel. The natural acids of the grape (tartaric and malic acids) are nonvolatile, and their acidity is felt on the tongue and palate. The acid of vinegar (acetic acid) is volatile, and is tasted in the pharynx as well as in the mouth and is smelled in the nasal passages.

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Wine Making Supplies

- The following are suggested as possible sources, but cannot be endorsed by Cornell University:
- National Filter Media Corp., 1717 Dixwell Ave., New Haven, CT 06514 (Press cloths)
- Presque Isle Wine Cellars, 9440 Buffalo Rd., North East, PA 16428
- Wine Art of Rochester, 1771 Ridge Road East, Rochester, NY 14622
- The Winemaker's Shop, Bully Hill Farms and Vineyards, R.D. 2, Hammondsport, NY 14840

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Revised 8/80 CP 3M 6993-A